

What is claimed is:

1           1.     An audio recording medium, comprising:  
2                 a plurality of tracks;  
3                 audio data recorded in the plurality of tracks; and  
4                 identification data for indicating a start position of each of the tracks  
5 recorded in write units segregated from the audio data in the plurality of tracks.

1           2.     The audio recording medium of claim 1, wherein the identification data  
2 are recorded in at least one write unit at the start of each of the tracks.

1           3.     The audio recording medium of claim 2, wherein the audio data are  
2 recorded in at least one write unit, following the identification data recorded in the at  
3 least one write unit.

1           4.     The audio recording medium of claim 1, wherein each write unit  
2 includes an audio object unit (AOBU), and the identification data includes mute data.

1           5.     The audio recording medium of claim 4, wherein a mute period for the  
2 mute data is equal to or shorter than the duration of a single one of the AOBUs.

1           6.     The audio recording medium of claim 5, wherein the mute period has a  
2 duration from a track start point to an end of the AOBU with mute data, and the mute  
3 period is varied by moving a location of the track start point.

1           7.     The audio recording medium of claim 4, wherein a mute period for the  
2 mute data is longer than the duration of a single one of the AOBUs, and a number of  
3 the AOBUs with mute data in each track is determined such that a sum of a duration  
4 of each of the AOBUs with mute data in each track is equal to or slightly longer than  
5 the mute period.

1           8.     The audio recording medium of claim 7, wherein the mute period  
2 includes a period from a track start point to an end of a last one of the AOBUs

among the plurality of the AOBUs with mute data in each track, and the mute period is varied by moving the location of the track start point.

9. The audio recording medium of claim 4, further comprising a reproduction control information area in which information on the mute period is recorded.

10. The audio recording medium of claim 4, wherein the mute data are indexed with Index 0.

11. A method of recording data in a plurality of tracks of a recording medium, and reproducing data from the recording medium, the method comprising:  
recording identification data indicating a start position of each of the tracks in predetermined write units in the plurality of tracks; and  
recording audio data in write units segregated from the predetermined write units of the identification data in the plurality of tracks.

12. The method of claim 11, further comprising:  
reading and reproducing the identification data recorded in the predetermined write units; and  
reading and reproducing the audio data recorded in the write units segregated from the predetermined write units of the identification data.

13. The method of claim 12, wherein the recording of the identification data comprises recording the identification data in at least one write unit at a start of each of the tracks.

14. The method of claim 13, wherein each write unit includes an audio object unit (AOBU), and the identification data includes mute data.

15. The method of claim 14, wherein a mute period for the mute data is equal to or shorter than a duration of a single one of the AOBUs.

1           16.    The method of claim 15, wherein the mute period includes a duration  
2 from a track start point to an end of the AOBUs with mute data, the method further  
3 comprising varying the mute period by moving a location of the track start point.

1           17.    The method of claim 14, wherein a mute period for the mute data is  
2 longer than the duration of a single one of the AOBUs, and a number of the AOBUs  
3 with mute data in each track is determined such that a sum of the duration of each of  
4 the AOBUs with audio data in each track is equal to or slightly longer the mute  
5 period.

1           18.    The method of claim 7, wherein the mute period includes a duration  
2 from a track start point to an end of a last one of AOBUs among the plurality of the  
3 AOBUs with mute data, the method further comprising varying the mute period by  
4 moving a location of the track start point.

1           19.    The method of claim 14, further comprising recording information on  
2 the mute period in a reproduction control information area.

1           20.    The method of claim 14, further comprising indexing the mute data with  
2 Index 0.

1           21.    A method of reproducing data recorded in a plurality of tracks of a  
2 recording medium, the method comprising:  
3           reading and reproducing identification data indicating a start position of each  
4 of the tracks, the identification data having been recorded in write units in the tracks  
5 of the recording medium; and  
6           reading and reproducing audio data having been recorded in write units  
7 segregated from the write units of the identification data in the tracks of the  
8 recording medium.

1           22.    The method of claim 21, wherein the identification data have been  
2 recorded in at least one write unit at a start of each of the tracks.

1           23.    The method of claim 22, wherein each write unit includes an audio  
2 object unit (AOBU), and the identification data includes mute data.

1           24.    The method of claim 23, further comprising performing a mute  
2 operation for a mute period, wherein the mute period for the mute data is equal to or  
3 shorter than a duration of a single AOBUs.

1           25.    The method of claim 24, further comprising varying the mute period by  
2 moving a location of a track start point, wherein the mute period includes a duration  
3 from the track start point to an end of the AOBU with mute data.

1           26.    The method of claim 23, further comprising performing a mute  
2 operation for a mute period, wherein the mute period for the mute data is longer than  
3 a duration of a single one of the AOBUs, and a number of the AOBUs with mute  
4 data in each track is determined such that a sum of a duration of each of the AOBUs  
5 in each track is equal to or slightly longer than the mute period.

1           27.    The method of claim 26, further comprising varying the mute period by  
2 moving a location of a track start point, wherein the mute period includes a duration  
3 from the track start point to an end of a last one of the AOBUs among the plurality of  
4 the AOBUs with mute data in each track, and the mute period is varied by moving a  
5 location of the track start point.

1           28.    A method of reproducing data recorded in a plurality of tracks of a  
2 recording medium in which identification data for indicating the start position of each  
3 of the tracks are recorded in write units in each track, and audio data are recorded in  
4 write units segregated from the write units of the identification data in each track, the  
5 method comprising:

6           once a reproduction command for one of the tracks is input, searching for the  
7 write units with audio data in the the one track; and  
8           reading and reproducing the audio data from the found write units.

1           29.   The method of claim 28, wherein the identification are recorded in at  
2 least one write unit at a start of each of the tracks.

1           30.   The method of claim 29, wherein each write unit includes an audio  
2 object unit (AOBU), and the identification data includes mute data.

1           31.   A method of recording data in a plurality of tracks of a recording  
2 medium, and reproducing data from the recording medium, the method comprising:  
3           determining whether there is a need to record identification data indicating a  
4 start position of each of the tracks in a corresponding one of the tracks;  
5           if recording of the identification data is needed, recording the identification  
6 data in the corresponding track in at least one write unit; and  
7           recording audio data in the corresponding track in at least one write unit  
8 segregated from the at least one write unit of the identification data.

1           32.   The method of claim 31, wherein the recording of the audio data  
2 comprises recording the identification data in the at least one write unit at a start of  
3 each of the tracks.

1           33.   The method of claim 32, wherein the recording of the audio data  
2 comprises recording the audio data in the at least one write unit, following the at  
3 least one write unit of the identification data.

1           34.   The method of claim 33, further comprising:  
2           reading and reproducing the identification data recorded in the at least one  
3 write unit at a start of each of the tracks; and  
4           successively reading the audio data recorded in the at least one write unit,  
5 following the identification data, and reproducing the read audio data.

1           35.    The method of claim 34, wherein each write unit includes an audio  
2   object unit (AOBU), and the identification data includes mute data.

1           36.    An apparatus for recording data in a plurality of tracks of a recording  
2   medium, in which identification data indicating a start position of each of the tracks  
3   are recorded in write units in each of the tracks, and audio data are recorded in write  
4   units segregated from the write units of the identification data in each of the tracks.

1           37.    The apparatus of claim 36, wherein the apparatus records the  
2   identification data in the at least one write unit at a start of each of the tracks.

1           38.    The apparatus of claim 37, wherein the apparatus records the audio  
2   data in the at least one write unit, following the at least one write unit with the  
3   identification data.

1           39.    The apparatus of claim 38, comprising:  
2           a write unit generator generating the at least one write unit audio data, and  
3           the at least one write unit with the identification data;  
4           a write portion writing each of the at least one write unit with the audio data  
5           and the at least one write unit with the identification data in the corresponding tracks;  
6           and  
7           a controller outputting a command to the write operation to instruct generation  
8           of the at least one write unit with the identification data to the write portion.

1           40.    The apparatus of claim 39, wherein each write unit includes an audio  
2   object unit (AOBU), and the identification data includes mute data.

1           41.    The apparatus of claim 40, wherein:  
2           the controller outputs a track start point to the writing portion, the track  
3   start point allowing a mute period for the mute data to be equal to or shorter than a  
4   duration of a single one of the AOBUs with the mute data; and

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5 the write portion writes the track start point from the controller in a  
6 reproduction control information area of the recording medium.

1 42. The apparatus of claim 41, wherein the mute period includes a  
2 duration from the track start point to an end of the AOBU with mute data, and the  
3 mute period is varied by moving the location of the track start point.

1 43. The apparatus of claim 40, wherein:  
2 the controller outputs a track start point to the writing portion, the track  
3 start point allowing a mute period for the mute data to be longer than a duration of a  
4 single one of the AOBUs, and the controller outputs information on a number of the  
5 AOBUs with mute data corresponding to the mute period to the write unit generator;  
6 and

7 the write unit generator generates the number of AOBUs with mute  
8 data according to the information from the controller.

1 44. The apparatus of claim 43, wherein the mute period includes a  
2 duration from the track start point to an end of a last one of AOBUs among the  
3 AOBUs with mute data in each track, and the controller varies the mute period by  
4 moving the location of the track start point in response to an input from a user.

1 45. The apparatus of claim 44, wherein the write generator determines the  
2 number of the AOBUs with mute data such that a sum of a duration of each of the  
3 AOBUs with mute data in each track is equal to or slightly longer than the mute  
4 period.

1 46. An apparatus for reproducing data recorded in a plurality of tracks of a  
2 recording medium, in which identification data recorded in predetermined write units  
3 to indicate a start position of each of the tracks are read from each of the tracks and  
4 reproduced, and audio data recorded in write units segregated from the write units of  
5 the identification data are read from each of the tracks and reproduced.

1           47.    The apparatus of claim 46, wherein the apparatus reads and  
2 reproduces the identification data recorded in at least one of the write units at the  
3 start of each of the tracks.

1           48.    The apparatus of claim 47, wherein the apparatus reads and  
2 reproduces the audio data recorded following the identification data in at least one of  
3 the write units segregated from the at least one write unit of the identification data .

1           49.    The apparatus of claim 48, comprising:  
2           a controller outputting a command to instruct reading of the identification data  
3 or the audio data recorded in the corresponding at least one write unit;  
4           a reading portion reading the identification data or the audio data recorded in  
5 the corresponding at least one write unit, according to the command from the  
6 controller; and  
7           a reproduction portion receiving and reproducing the identification data or the  
8 audio data from the reading portion.

1           50.    The apparatus of claim 49, wherein each write unit includes an audio  
2 object unit (AOBU), and the identification data includes mute data.

1           51.    The apparatus of claim 50, wherein:  
2           the controller outputs reproduction control information corresponding to  
3 an input from a user to the reading portion; and  
4           the reading portion searches for the AOBU having a track start point in  
5 a corresponding track, finds a location of the track start point in the found AOBU,  
6 read data from the track start point in the corresponding track, and outputs the read  
7 data to the reproduction portion.

1           52.    The apparatus of claim 51, wherein a mute period for the mute data  
2 includes a duration from the track start point to an end of the AOBU with mute data,  
3 and the controller varies the mute period by moving the location of the track start  
4 point in response to an input from a user.



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1           53.    The apparatus of claim 52, wherein once the reading portion reads the  
2    AOBU with the mute data and outputs the read AOBU to the reproduction portion,  
3    the reproduction portion mutes outputs for the mute period.

1           54.    The apparatus of claim 53, wherein once the AOBU with mute data is  
2    read by the reading portion, the controller outputs a mute command to the  
3    reproduction portion, and the reproduction portion performs a mute operation  
4    according to the mute command from the controller.

1           55.    An audio recording medium comprising:  
2           a plurality of tracks, each track comprising audio data recorded in at least one  
3    write unit, and identification data indicating a start position of the track and recorded  
4    in at least one write unit segregated from the audio data in the track.

1           56.    The audio recording medium of claim 55, wherein the identification data  
2    comprises mute data, and a number of the at least one write unit of the mute data is  
3    such that a sum of a duration of each of the at least one write unit of the mute data  
4    is at least as long as a mute period between the tracks in a reproduction mode.

1           57.    The audio recording medium of claim 56, further comprising a  
2    reproduction control information area in which the mute period is recorded.

1           58.    The audio recording medium of claim 57, wherein the mute period is  
2    assigned Index 0 to the mute period from a start point of one of the tracks to a start  
3    point of the at least one write unit of audio data.

1           59.    A method of recording data on an audio recording medium having a  
2    plurality of tracks, comprising:  
3           recording mute data in at least one write unit in each of the tracks; and  
4           recording audio data in at least one write unit in each of the tracks so as to be  
5    segregated from the at least one write unit of the mute data.

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1           60. The method of claim 59, wherein:  
2           the recording of the mute data comprises  
3                 determining whether a mute period is required in recording a new one  
4 of the tracks,  
5                 determining a number of the write units of mute data to be recorded in  
6 the new track,  
7                 recording the number of write units of the mute data in the new track,  
8 and  
9                 writing the mute period in a reproduction control information area of the  
10 audio recording medium; and  
11           the recording of the audio data comprises writing the audio data following the  
12 mute data in the new track.

1           61. A method of reproducing audio data from an audio recording medium in a  
2 reproducing apparatus and having a plurality of tracks in which at least one write unit  
3 of mute data and at least one write unit of the audio data segregated from the at  
4 least one write unit of the mute data are recorded in each of the tracks, the method  
5 comprising:

6                 reading the mute data recorded in the at least one write unit from one of the  
7 tracks;

8                 muting an output of the reproducing apparatus for a mute period of the mute  
9 data; and

10                 reading the audio data recorded in the at least one write unit, and reproducing  
11 the audio in the at least one write unit after an end of the mute period.

1           62. The method of claim 61, wherein the audio recording medium includes a  
2 reproduction control information area having the mute period, and the reading of the  
3 mute data comprises:

4                 searching for one of the write units of the mute data having a track start point  
5 corresponding to an input from a user in the one track; and

6                 reading the at least one write unit of the mute data from the track start point.

63. A recording apparatus for recording audio data on an audio recording medium having a plurality of tracks, the recording apparatus comprising:  
a processor which generates at least one write unit of identification data indicating a start position for each of the tracks and at least one write unit of the audio data segregated from the at least one write unit of the identification data in each of the tracks; and  
a recording portion which records the at least one write unit of the identification data and then the at least one write unit of the audio data in said each track.

64. The recording apparatus of claim 63, wherein the identification data comprises mute data, and a number of the at least one write unit of the mute data is such that a sum of a duration of each of the at least one write unit of the mute data is at least as long as a mute period between the tracks in a reproduction mode.

65. A reproducing apparatus for reproducing audio data from an audio recording medium in a reproducing apparatus and having a plurality of tracks in which at least one write unit of mute data indicating a starting point of each track and at least one write unit of the audio data segregated from the at least one write unit of the mute data are recorded in each of the tracks, the reproducing apparatus comprising:

a reproducing portion reading the mute data recorded in the at least one write unit from one of the tracks and reading the audio data recorded in the at least one write unit from the one track; and

a processor muting an output of the reproducing portion for a mute period of the mute data, and reproducing the audio data recorded in the at least one write unit after an end of the mute period.

66. The reproducing apparatus of claim 65, wherein the audio recording medium includes a reproduction control information area having the mute period, and the reproducing portion searches for one of the write units of the mute data

- 4 having a track start point corresponding to an input from a user in the one track, and
- 5 reads the at least one write unit of the mute data from the track start point.

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